

Assessing psychometric properties of the Turkish version of the Diabetes Caregiver Activity and Support Scale (D-CASS)

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ABSTRACT

Aim: The study was a methodological conducted to evaluate the validity and reliability of the Turkish version of the Diabetes Caregiver Activity and Support Scale (D-CASS).

Methods: This study was included on 272 individuals who cared for patients diagnosed with type 2 diabetes at least one year ago. Language, content, internal criterion, construct-concept validity were used to test the validity of the scale, and cronbach alpha, item-scale correlation, and test-retest were used to test the reliability.

Results: The CVI was 0.95. The study was conducted with 272(60.3% female, 39.7% male) caregivers of individuals with type 2 diabetes. The study was found four week test-retest reliability with $r = 0.70$, $p < 0001$. The factor loadings of the scale items are between 0.77 and 0.95. The single factor obtained explains 75% of the total variance. The scale was found to have a high degree of reliability (Cronbach alpha=0.95).

Conclusion: The activities and supportive behaviours scale of caregivers of individuals with type 2 diabetes(D-CASS) is a valid and reliable measurement tool that can be used for the Turkish population.

1. Introduction

Type 2 diabetes is an important public health problem affecting millions of people worldwide, and its prevalence is increasing faster than expected [1]. According to the International Diabetes Federation, it is estimated that approximately 425 million people had diabetes at the end of 2017, and this number will increase by 48% to approximately 630 million in 2045. Turkey will be one of the 10 countries with the highest number of people with diabetes worldwide [2]. According to the 2010 Turkish Diabetes Epidemiology (TURDEP-2) study, the prevalence of diabetes in Turkey increased from 7.2% to 13.7% in 12 years (1998–2010) [3].

Diabetes is a chronic disease with complications and self-care is one of the main factors in the management. At the same time, together with complications and self-care management activities diabetes is a disease that affects patients and families. Family members usually in the Turkish population, become caregiver roles. Therefore caregivers, consist of family members who provide support in meeting physical, psychological, and social needs, without receiving any payment. Family caregivers

can be defined as spouses or relatives who provide comprehensive care and support to individuals with chronic diseases. [4]. The activities and activities of family members in the caregiving process can be explained as supporting the individual with type 2 diabetes when necessary (medication adherence, prevention or management of diabetes-related complications, nutritional management, and glycaemic control). The fact that the caregiving process in the family becomes long-term increases the burden of the caregiver when combined with factors such as the work and social life of the caregiver [5]. Many caregivers find it difficult to manage these activities together with their own lives. Also, complications acute (hypoglycemia, and hyperglycemia) and chronic (retinopathy, amputation, coronary artery disease, cerebrovascular event) which develop due to non-compliance with treatment and poor self-management of the diabetic patient, increase the burden of caregivers [6,7]. While trying to provide physical, psychological, and social support, caregivers' own burdens related to these dimensions also increase. There are studies in the literature regarding caregiver burden. Caregivers will ensure that many problems of the patient are recognized in the early period by providing not only physical support but also

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emotional support (irritability, depression), however, emotional support increases the burden of caregivers [8]. The active role of caregivers in the management of the disease will ensure effective symptom management, prevention of complications, compliance with treatment, and organization of lifestyle [9–11].

Although there are sufficient studies on caregivers of children with type 1 diabetes, studies on caregivers of individuals with type 2 diabetes are limited [12]. Bakas et al. (2002) identified five categories for the needs and concerns of caregivers. These were grouped as 1: information and resources related to type 2 diabetes (nutrition and exercise), 2: caring for the feelings and behaviors of the person receiving care (emotions, social activity, communication), 3: providing physical care (medication, blood glucose regulation, skin care), 4: providing instrumental care (medical expenses, transportation to hospital), 5: personal reactions of the caregiver (emotions and health of the person, coping with new responsibilities, social life) [13].

Studies conducted in the USA have reported that family members caring for patients with diabetes have difficulties in nutrition, exercise, medical treatment (oral antidiabetic and insulin administration), and management of diabetes-related complications [14,15]. Studies have reported difficulties experienced by caregivers of individuals with diabetes, such as poor glycemic control of their relatives, conflict with the patient, and perceiving diabetes as a burden [14,16,17]. In addition, caregivers have been reported to experience depression, restriction in social activities, emotional stress, sleep, and health problems, deterioration in quality of life, deterioration in well-being, job losses, decreased productivity, and financial difficulties. Caregivers experience a care burden due to problems occurring in the care process [14,18,19]. In our country, studies on the difficulties experienced by caregivers of individuals with diabetes are limited. In a study conducted by İlaslan et al. (2021), the burden of caregiving of individuals with type 2 diabetes was found to be moderate [20]. In the study conducted by Çiftçi et al. (2021), diabetes knowledge levels and awareness status of caregivers of individuals with type 2 diabetes were found to be low [21].

Scarton et al. (2022) developed the Diabetes Caregiver Activity and Support Scale (D-CASS) to determine the behaviors in which caregivers of individuals with type 2 diabetes have difficulty and the caregiver's ability to meet their self-care needs [22]. In our country, no scale assesses how easy or difficult caregivers of individuals with diabetes perceive the care activities and supportive behaviors they perform regularly. This study aimed to determine the validity and reliability of D-CASS among caregivers of individuals with type 2 diabetes in Turkish society and to introduce its Turkish version into the literature.

2. Material and methods

2.1. Study design

This methodological study is planned to test the validity and reliability of D-CASS in the Turkish version.

2.2. Participants and setting

The data were collected from the relatives of individuals with type 2 diabetes who applied to a training and research hospital in Turkey between October 2022 and February 2023. In the literature, it is recommended that the sample size of scale studies should be 5–10 times the number of scale items [5]. Because there were 11 items on the scale, the sample size was determined to be 110, and 272 family members caring for individuals with diabetes were included in the study. Validity and reliability studies excluded dependent or independent variables. Caregivers of patients diagnosed with type 2 diabetes at least 1 year ago who were older than 18 years of age, cared for the individual with diabetes without charge, had no neurological and mental problems, had no visual and auditory problems, could communicate verbally, and agreed to participate in the study were included in the study. The data were

collected in an average of 5 min using a face-to-face interview technique. This period was slightly longer for the elderly. Analysis methods related to validity and reliability were used to evaluate the data.

2.3. Ethical considerations

Permission to conduct the study was obtained from the scale owner (Lisa J. Scarton) via e-mail on 12.05.2022. Ethics committee permission was obtained from the Non-Interventional Research Ethics Committee of the relevant university (decision no: 2022/29–18 date: 14.09.2022) and written institutional permission (11.10.2022) from the institution where the data were collected. Written and verbal information was provided to the participants in the study, and a written and verbal informed consent form was obtained. This study was conducted by the principles of the Declaration of Helsinki.

2.4. Data collection form

2.4.1. Descriptive information form

This form, prepared on the literature by the researchers, consists of questions regarding the patient's sociodemographic characteristics and disease history (diabetes diagnosis year, treatment, frequency of hypoglycemia).

2.4.2. Diabetes Caregiver Activity and Support Scale (D-CASS)

The D-CASS is a developed to determine the difficulties perceived by caregivers of individuals with diabetes. The D-CASS is a scale consisting of 11 questions to determine the extent to which patients have difficulty in information and treatment support (diabetes-related complications and adjustment of nutrition), emotional support (sadness, depression), blood glucose management support (exercise, and helping to regulate blood glucose), and coping with their problems (meeting one's own health needs). The scale items are scored between – 3 (very difficult), + 3 (very easy), and 0 neither easy nor difficult. The analysis, the items were scored between 1 and 7. The total score on the scale is a minimum of 11 and a maximum of 77 points. It is a one-dimensional scale. Low scores indicate that caregivers have difficulty in fulfilling their activities, whereas high scores indicate that they do it easily. In the study in which D-CASS was developed, it was found to be valid and reliable in caregivers of 101 individuals with type 2 diabetes, cronbach's alpha: 0.82, and the test-retest correlation coefficient 0.70 [22].

2.5. Validity

2.5.1. Linguistic validity

The scale adaptation, written communication was established with the owner of the scale, and permission to use the original scale was obtained. In the second stage, the original scale was translated into Turkish by 4 different translators (1 of them is a professional translator who knows both languages and cultures and has a relationship with the health field, the other 3 are health professionals who know both languages). The samples received from the translators were sent to 1 different translator (a professional translator who knows both languages and cultures and has a relationship with the health field). The scale was finalized by the responsible researchers by considering the translations from the translators. Then, the scale was presented to 12 experts (7 PhD nurse, and 5 registered nurses). In this context, the language compatibility and comprehensibility of the translated scale were evaluated by the experts. Blinding was done between experts. After the suggestions from the experts, the scale was finalized and a preliminary application was performed with 15 patients to evaluate the comprehensibility of the scale by patients [22,23].

2.5.2. Content validity

Evaluate to the content validity of the scale, all the items included in the measurement tool should measure the measured characteristic, and

each detail of the measured characteristic should be questioned by the items in the scale. The most widely accepted and most frequently used numerical method for evaluating the content validity of the entire scale is the calculation of the content validity index (CVI) value developed by Lawshe [5,24].

2.5.3. Construct-concept validity (exploratory factor analysis)

Check to the construct concept validity of the scale, exploratory factor analysis was conducted using the principal component method. The conformity of the findings obtained from the data collected from the participants with the theoretical scale structure was investigated by confirmatory factor analysis, a type of structural equation modeling. Finally, validity and reliability analyses of the scale were performed. The analyses were performed using the IBM SPSS Statistics Amos 23 program. Before the exploratory factor analysis, the Kaiser-Meyer-Olkin (KMO) test and Barlett’s test was applied to test whether the sample size was suitable for factor analysis.

2.6. Reliability analyses

Internal consistency is an indicator of whether each item in the scale moves in the same direction as the entire scale structure. In the item-total correlation coefficient analysis, the item-total correlation coefficient that an item should have should not be less than 0.20. Items with a 0.20 item-total correlation should be removed from the scale [27]. In the test-retest method, it is important to determine the time interval between two applications. In practice, this interval is recommended to be 2–4 weeks [24]. The test-retest of D-CASS was performed four weeks later with 82 caregivers. If Cronbach’s alpha internal consistency coefficient, which is an important indicator of the reliability of a measurement tool, takes a value greater than 0.70, the scale is considered reliable. The internal consistency of DCASS was determined by Cronbach’s alpha coefficient.

3. Results

The sample of this study consisted of 272 (60.3% female, 39.7% male) individuals cared for patients with type 2 diabetes. The mean age was found to be 46.58 ± 13.51 years. It was determined that 47% of the individuals participating in the study were working, 34.6% were not working, and 18.4% were retired. According to educational status, 36.8% were primary school graduates. Of the individuals with diabetes who received care, 69.1% were female and 30.9% were male. The mean age was 67.71 ± 10.40 years, 55.9% were retired, and 69.9% were primary school graduates. The mean duration of diabetes diagnosis was 13.30 ± 7.53; 45.2% used OAD, 24.3% insulin, and 30.5% OAD + insulin. It was found that 68% of our patients had previously experienced hypoglycemia and 27.6% had been hospitalized because of diabetes (Table 1).

3.1. Validity

The content validity criteria were transformed into a table by their minimum values at a significance level of 0.05 [25]. Accordingly, the minimum values related to the number of experts also provide the statistical significance of the item. The minimum statistical significance value for experts (12 experts in total) is 0.56. When the content validity ratio (CVR) value of the scale items was examined, it was determined that it was 0.66–1.0. It is obtained from the total CVR averages of the items that are significant at the CVI= 0.05 level and will be included in the final form. It was determined that CGI= 0.95 for 12 experts. Since CVI>CVR, the content validity of the entire scale created is statistically significant. [5,24,26].

Because of the analysis, it was determined that the KMO value was 0.94. In line with this value, it was concluded that the sampling adequacy was "good enough" for factor analysis. In addition, when Bartlett’s

Table 1
Descriptive characteristics (n:272).

Characteristics	Value
Characteristics of the caregiver	
Gender, n (%)	Characteristics of the caregiver
	Female 164 (60.3)
	Male 108 (39.7)
Average age, mean ± SD	46.58 ± 13.51
Marital status, n (%)	
	Married 220 (80.9)
	Single 52 (19.1)
Occupation, n (%)	
	Working 128 (47.0)
	Not working 94 (34.6)
	Retired 50 (18.4)
Educational status, n (%)	
	Illiterate 5 (1.9)
	Primary school 100 (36.8)
	High school 89 (32.5)
	License 72 (26.5)
	MSc / Dr. 6 (2.3)
Characteristics of an individual with diabetes	
Gender, n (%)	Characteristics of an individual with diabetes
	Female 188 (69.1)
	Male 84 (30.9)
Average age, mean ± SD	67.71 ± 10.40
Marital status	
	Married 232 (85.3)
	Single 40 (14.7)
Occupation, n (%)	
	Working 26 (9.6)
	Not working 94 (34.5)
	Retired 152 (55.9)
Educational status, n (%)	
	Illiterate 39 (14.3)
	Primary school 190 (69.9)
	High school 21 (7.7)
	License 22 (8.1)
Diabetes diagnosis time, min-max/ mean ± SD	1–36 years / 13.30 ± 7.53
Diabetes treatment, n (%)	
	OAD 123 (45.2)
	Insulin 66 (24.3)
	OAD+Insulin 83 (30.5)
Does Hypoglycemia Survive?	
	Yes 185 (68)
	No 87 (32)
Frequency of hypoglycemia (1 month), min-max / mean	0–20 / 4.50 ± 4.3
Hospitalization for Diabetes	
	Yes 75 (27.6)
	No 197(72.4)

OAD: Oral Antidiabetic Drug.

test results were examined, it was seen that the chi-square value obtained was at an acceptable level and the data were suitable for factor analysis (x²: 3820,26, p < 0.001). Before factor analysis, the correlation between the questions was examined, and no structure that would affect factor analysis was found (Rho: ranging between 0.77 and 0.95). It was observed that all factor loadings were greater than 0.30. According to this result, the importance of all questions within the factor is sufficient. The single factor obtained explains 75.35% of the total variance (Table 2).

3.2. Confirmatory factor analysis

According to the confirmatory factor analysis, it was determined that the structural equation modeling results of the scale were significant at the level of p < 0.001 and were related to the 11-item scale structure forming the scale. Improvement is made in the model. While improving

Table 2
D-CASS Construct and Scope Validity.

	Factor Loads	Total explained variance %
Item 1	0,79	75.35
Item 2	0,77	
Item 3	0,83	
Item 4	0,78	
Item 5	0,90	
Item 6	0,80	
Item 7	0,90	
Item 8	0,95	
Item 9	0,91	
Item 10	0,95	
Item 11	0,89	
Kaiser-Meyer- Olkin test	0,94	p < 0.001 *
Bartlett sphericity test	X ² = 3820.26	

the model, the variables that reduce the fit were determined and new covariances were created for those with high covariance among the residual values (e1-e7; e3-e4; e3-e11; e4-e6; e4-e10; e6-e7; e9-e10; e9-e11). The table shows that the accepted values for the fit indices were met in the first calculated fit indices and the renewed fit index calculations after the improvement. When the goodness of fit indices of the scale developed according to the results of the multi-factor model confirmatory factor analysis was examined; Root mean square error of approximation (RMSEA) 0,10; Normalized fit index (NFI) 0,96; Comparative fit index (CFI) 0,97; Incremental fit index (IFI) 0,97; Tuckerlewis index (TLI) 0,96; Adjusted goodness of fit index (AGFI) 0,85; Chi-squared (CMIN); 137,21; CMIN/df 3,81 (p < 0001) values were found to be at an acceptable level (Fig. 1).

3.3. Reliability analyses

3.3.1. Internal consistency analyses

A significant difference was also found between the lower and upper groups for the items on the scale (p < 0.001) (Table 3). The item-total score correlations of the D-CASS ranged between 0.77 and 0.93, and the correlation coefficients were statistically significant. The

Table 3
Item Analysis Based on the Sub Groups and Upper Groups.

Item	Group	n	X	SD	p-value
Item 1	SG	73	1.58	0.79	< 0.001
	UG		5.80	1.53	< 0.001
Item 2	SG	73	1.82	1.18	< 0.001
	UG		5.95	1.24	< 0.001
Item 3	SG	73	1.80	0.73	< 0.001
	UG		6.42	0.72	< 0.001
Item 4	SG	73	1.57	0.52	< 0.001
	UG		5.95	1.15	< 0.001
Item 5	SG	73	1.86	0.83	< 0.001
	UG		6.42	0.62	< 0.001
Item 6	SG	73	2.12	1.11	< 0.001
	UG		5.90	0.91	< 0.001
Item 7	SG	73	1.60	0.63	< 0.001
	UG		6.31	0.79	< 0.001
Item 8	SG	73	1.36	0.51	< 0.001
	UG		6.53	0.66	< 0.001
Item 9	SG	73	1.34	0.58	< 0.001
	UG		6.61	0.51	< 0.001
Item 10	SG	73	1.50	0.60	< 0.001
	UG		6.43	0.62	< 0.001
Item 11	SG	73	1.38	0.61	< 0.001
	UG		6.35	0.69	< 0.001

SD: standard deviation, SG: subgroup, UG: upper group, X: Mean.

correlations were statistically significant for all items in test–retest measurement (r = 0.97; p < 0.001). Cronbach’s alpha coefficient of the scale was found to be α = 0.97 and it was determined to have a high degree of reliability. When the item descriptive statistics of the DCASS were analyzed, it was seen that the item means ranged between X = 3.80 ± 2.14 at the lowest and X = 4.31 ± 2.16 at the highest (Table 4).

4. Discussion

In the management of diabetes, a chronic disease, the support of family members and their participation in care activities have positive contributions to the course of the disease. To use measurement tools in different societies, it is necessary to test the applicability of the tool in that society and to determine whether it measures what is desired [28]. This study was conducted methodologically in line with the validity and reliability analysis with the caregivers of individuals with type 2 diabetes to adapt the D-CASS to Turkish society. In this study, the item analyzes of the scale were found to be within the ranges compatible with the original. The scale was confirmed to be unidimensional. High test-retest correlations indicate that the scale is highly reliable for our society as well. In this study, there are no items with correlations and averages under the scale analysis limits, which shows that the scale is suitable for use in our society. The fact that the total correlations of the scale did not change when the items were deleted confirmed that the scale items were compatible with each other. There were no items/phrases removed in the language translation and back-translation studies regarding language validity and content validity.

In terms of language validity, the language, culture, and knowledge level of the society to be applied must be appropriate. At this stage, two independent translators translated the scale into Turkish and two other independent translators translated the scale into English, the original language. After receiving expert opinion, the researcher finalized the scale and a pilot application was conducted. After similar applications were made at the language validity stage, final corrections were made and the scale was submitted to expert opinion for content validity and finalized [23,24,29].

This study, the mean age of caregivers was 46 years and that of individuals with diabetes was 67 years. Scarton et al. (2017), who developed the scale, found that the mean age of caregivers was 51 years and that of individuals with diabetes was 61 years [22]. In the study

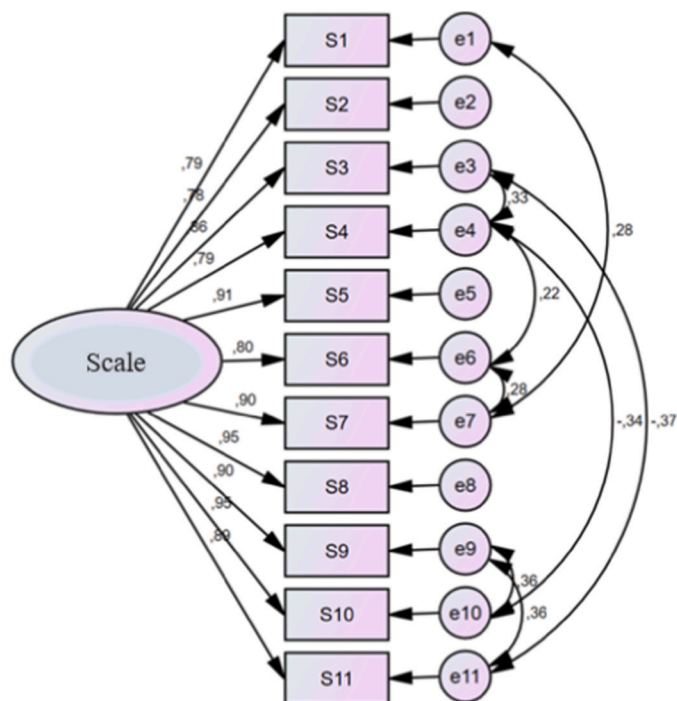


Fig. 1. Confirmatory Factor Analysis of D-CASS.

Table 4
D-CASS Reliability Analyses and Descriptive Statistics.

	Cronbach alpha when item is deleted	r	X	SS	Minimum	Maximum
1. Listen to the person with diabetes when he or she experiences depressive symptoms (sadness)	0,97	0,78	4,05	2,16	1	7
2. Avoid nagging	0,97	0,77	3,93	2,01	1	7
3. Prepare a range of meals that appeal to the person with diabetes	0,96	0,84	4,31	2,20	1	7
4. Count carbohydrates when preparing meals for the person with diabetes	0,97	0,78	3,80	2,14	1	7
5. Help the person stabilize his or her blood sugar (keep it from going high or low)	0,96	0,89	4,11	2,08	1	7
6. Exercise with your loved one to help encourage physical activity	0,97	0,79	3,97	1,86	1	7
7. Deal with your feelings (fear, worry) related to your loved one having diabetes-associated complications (low blood sugar, kidney disease)	0,96	0,90	4,18	2,08	1	7
8. Balance your life now that you have caregiving responsibilities	0,96	0,93	4,14	1,86	1	7
9. Take care of your own health needs	0,96	0,89	3,98	2,31	1	7
10. Keep your energy level up while caring for the person with diabetes	0,96	0,92	4,08	2,16	1	7
11. Take time to relax	0,96	0,86	3,89	2,24	1	7
Total	0,97		44,48	20,68	11	77

conducted by Satoshi et al. (2020), the mean age of caregivers was found to be 63 years and that of individuals with diabetes was found to be 73 years [28]. The high proportion of the elderly in the Japanese population was effective in determining the average age. This study, 60.3% of the caregivers were female and 39.7% were male. In Satoshi et al. (2017), 72.3% of caregivers were female and 27.7% were male [28]. The fact that the caregiving role of women is more dominant in patriarchal societies causes women to assume a compulsory role in care. Therefore, female caregivers are predominant in Turkish and Japanese societies. This study, the mean duration of diabetes diagnosis was 13.3 years. Scarton et al. (2017) found 11.6 years [22].

The need for care of patients increases because type 2 diabetes starts approximately 10 years before the time of diagnosis and requires a transition to insulin treatment 10 years after diagnosis, and the accompanying complications increase with increasing diagnosis time [2]. In parallel with each other, the studies included similar patient groups with similar levels of care needs based on the average duration of diagnosis.

In this study, caregivers had the most difficulty in activity the 4. item (I count carbohydrates when preparing meals for people with diabetes). The mean score for item 4 was 3.80. This is because carbohydrate counting education is generally given to individuals with type 1 diabetes and their caregivers in Turkey. In addition, caregivers of individuals with type 2 diabetes are mostly primary school graduates and their knowledge of carbohydrate counting is low in this study. In Scarton et al., the most difficult activity was found to be item 4, and the mean score was 3.41. The 2. most difficult activity was found to be item 7 (I listen to the fears and concerns of patients with diabetes-related complications) [22]. This study, the second most difficult activity was item 2 (Avoid nagging). Because the caregivers in the study reported to the researcher that patients' noncompliance with treatment was high.

Satoshi et al. (2020) found that the most difficult practice was item 6 (I exercise with my loved ones to encourage them to do physical activity) with 3.3 points, and the second most difficult practice was item 7 (I listen to the feelings (such as fear, anxiety) of my loved ones with diabetes-related complications (such as low blood sugar, kidney disease)) [28]. The reason for this may be that the caregiver group was older and had chronic diseases. This study, item 6 (3.97) was found to be the third most difficult activity. 47.1% of the caregivers were working. Being tired from physical activity and having spouses and children to take care of are difficult for caregivers.

Before the exploratory factor analysis, the KMO test was applied to determine whether the sample size was suitable for factor analysis. This study, Kaiser-Meyer-Olkin test: 0,94; Bartlett Sphericity test $p < 0001$. In line with this finding, it was concluded that the sampling adequacy was "good enough" to perform factor analysis. In the study of Scarton et al. Kaiser-Meyer-Olkin test: 0,80; Bartlett Sphericity test $p: 0000$ was found. In the study by Satoshi et al. study, the Kaiser-Meyer-Olkin test

was found to be 0.86. Before factor analysis, the correlation between the questions was examined, and no structure that would affect factor analysis was found (Rho: ranging between 0.779 and 0.953). The single-factor D-CASS factor loadings as a result of the principal component analysis are shown in the table. It was observed that all factor loadings were greater than 0.30. According to this result, the importance of all questions within the factor is sufficient. The single factor obtained explains 75% of the total variance. In Scarton et al., factor loadings were between Rho: 0.45 and 0.70 and explained 32% of the total variance [22]. In the Satoshi et al. study, factor loadings ranged between Rho: 0.38 and 0.78 [28]. The high test-retest and correlation results of the scale show that the scale is reliable for Turkish society. When the scale items are deleted, the total Cronbach's alpha value does not increase and 9 scale items are confirmed.

Scarton et al., Cronbach's alpha was found to be 0.82 and unidimensional. This study the scale was confirmed to be unidimensional. In the literature, it was observed that caregiver scales were unidimensional [23,27,30]. Cronbach alpha: 0.86 was found in Satoshi et al. [28]. This study, Cronbach alpha: 0.97 was found to be a valid and reliable tool for the Turkish population. When exploratory factor analysis was performed, the scale was found to be unidimensional.

5. Conclusion and recommendations

In conclusion, the D-CASS developed by Scarton et al. in 2017 is a valid and reliable tool for the Turkish population. Using the D-CASS, it will be possible to determine the extent to which caregivers have difficulty in providing information and treatment support, emotional support, blood glucose management support, and coping with their problems.

Thanks to this scale, it will be possible to determine which activities are more difficult and which activities are easier for individuals caring for patients with diabetes. The scale will enable health professionals to provide holistic support not only to the patient but also to the caregiver who is a potential patient. Identifying the points where caregivers have difficulties and completing them with appropriate training will direct interventions to improve their quality of life. It is recommended that the validity and reliability of the scale be assessed among caregivers of type 1 diabetes patients.

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CRediT authorship contribution statement

Dilek Büyükkaya Besen, Merve Günbaş, Merve Dervişoğlu:

Concept, Design, Analysis and/or Interpretation, Writing manuscript. **Dilek Büyükkaya Besen:** Supervision, Critical review, Other. **Merve Günbaş, Merve Dervişoğlu:** Resources, Materials, Data collection and/or processing, Literature Search.

Declaration of Competing Interest

There was no conflict of interest among the authors involved in this

Appendix A. Turkish version of D-CASS

Hayır, bu aktiviteyi yapmıyorum	Evet, bu aktiviteyi yapıyorum (eğer öyleyse, o zaman değerlendirin)	Son derece zor	Ne zor ne kolay					Son derece kolay			
H	E	-3	-2	-1	0	+1	+2	+3			
1. Diyabeti olan birey, depresif belirtiler (üzüntü) yaşadığında dinlerim					-3	-2	-1	0	+1	+2	+3
2. Diyabeti olan bireye söylenmekten kaçınırım					-3	-2	-1	0	+1	+2	+3
3. Diyabeti olan bireye uygun yemek hazırlarım					-3	-2	-1	0	+1	+2	+3
4. Diyabeti olan bireye yemek hazırlarken karbonhidrat sayımı yaparım					-3	-2	-1	0	+1	+2	+3
5. Diyabeti olan bireyin kan şekeri dengelenmesinde (çok yüksek veya düşük olmasını engellerim) yardımcı olurum					-3	-2	-1	0	+1	+2	+3
6. Fiziksel aktivite yapmasını teşvik etmek için sevdiğimle birlikte egzersiz yaparım					-3	-2	-1	0	+1	+2	+3
7. Diyabetle ilişkili komplikasyonları (düşük kan şekeri, böbrek hastalığı gibi) olan sevdiğimlerin duygularını (korku, endişe gibi) dinlerim					-3	-2	-1	0	+1	+2	+3
8. Bakım sorumluluklarına göre hayatımı düzenlerim					-3	-2	-1	0	+1	+2	+3
9. Kendi sağlık ihtiyaçlarıma dikkat ederim					-3	-2	-1	0	+1	+2	+3
10. Diyabeti olan bireyin bakımını yaparken enerji seviyemi yüksek tutarım					-3	-2	-1	0	+1	+2	+3
11. Dinlenmek için kendime zaman ayırırım					-3	-2	-1	0	+1	+2	+3

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